

MEMORANDUM

DATE:		January 25, 2023
МЕМО ТО	:	Scott Edwards (Municipality of Magnetawan)
COPIES T	0:	Kerstin Vroom (Municipality of Magnetawan), Tim McBride (Pinchin)
FROM:		Sarah Burke (Pinchin)
RE:	Magne	etawan Waste Disposal Site Methane Monitoring – Fall and Winter 2022

PINCHIN FILE: 225335.006

1.0 INTRODUCTION

Pinchin Ltd. (Pinchin) was retained by the Municipality of Magnetawan (Municipality) to conduct a preliminary methane gas monitoring program to investigate potential methane gas production at the Croft and Chapman Waste Disposal Sites (WDSs) and prepare a report outlining landfill gas (methane) concentrations in comparison to the applicable criteria, as outlined in Ontario Regulation 232/98.

2.0 METHODOLOGY

The 2022 methane monitoring program conducted at the Chapman and Croft WDSs included two rounds of landfill gas monitoring events, one round occurring in the fall of 2022, and the second round occurring in the winter of 2022 (under frozen ground conditions). The fall monitoring event was completed on November 17, 2022, and the winter monitoring event was completed on December 15, 2022. The methane gas monitoring program was completed in accordance with Pinchin's Standard Operation Procedures (SOPs).

2.1 Groundwater Level Measurements

Static groundwater levels were manually measured at the Site during each monitoring event using a Solinst[™] water level meter. The water level meter was cleaned before initial use and between uses to minimize the potential for cross-contamination by washing with an Alconox[™]/potable water mixture followed by a deionized water rinse. The water levels were measured in order to determine if the well screens were submerged in order to evaluate whether or not that would have an effect on the gas monitoring results.

2.2 Landfill Gas Monitoring

Landfill gas (methane) monitoring was completed at thirteen (13) monitoring well locations at the Chapman WDS and eleven (11) monitoring well locations at the Croft WDS. Landfill gas measurements were obtained immediately after removing the monitoring well friction fit push-on caps, prior to collecting groundwater level measurements. Monitoring was completed using a GEM 2000 portable gas meter calibrated to detect 100% of the



lower explosive limit (LEL) for methane (CH₄). For landfill gas measurements calibrated for methane, 100% of the LEL is equivalent to 5% volume of methane in air.

3.0 RESULTS

The fall and winter 2022 landfill gas (methane) monitoring results are presented Tables 1 and 2 below for the Chapman and Craft Waste Disposal Sites, respectively.

Sample Date	Well ID	Screened Interval (masl)	Water Level (m)	Groundwater Elevation (masl)	Methane Concentration (%)
	BH1	N/A	6.88	307.18	0.5
	BH2	N/A	6.39	307.29	0.5
	BH3-II	319.35 – 316.30	4.68	318.62	0.4
	BH4	N/A	6.03	308.35	0.5
	BH4-II	308.67 – 305.23	6.22	308.39	0.5
	BH5-II	N/A	5.60	286.24	0.5
November 17, 2022	BH6-II	N/A	Dry.	N/A	0.5
	BH6-III	289.71 – 286.76	5.01	288.46	0.5
	BH7-II	N/A	Dry.	N/A	0.5
	BH8-I	287.81 – 284.81	4.26	287.46	0.5
	BH9-I	287.63 – 284.55	2.78	289.98	0.5
	BH10-I	312.79 – 309.74	2.34	312.83	0.6
	BH-11	317.54 – 314.46	1.89	318.23	0.4
December 15, 2022	BH1	N/A	6.82	307.24	0.1
	BH2	N/A	6.30	307.38	0.1

Table 1: Methane Monitoring Results for the Chapman Waste Disposal Site



BH3-II	319.35 – 316.30	1.83	321.47	0.1
BH4	N/A	6.06	308.32	0.2
BH4-II	308.67 – 305.23	5.84	308.77	0.1
BH5-II	N/A	4.58	287.26	0.1
BH6-II	N/A	Dry.	N/A	0.1
BH6-III	289.71 – 286.76	5.02	288.45	0.1
BH7-II	N/A	1.91	308.11	0.1
BH8-I	287.81 – 284.81	4.21	287.51	0.2
BH9-I	287.63 – 284.55	2.74	290.02	0.1
BH10-I	312.79 – 309.74	2.25	312.92	0.3
BH-11	317.54 – 314.46	4.62	315.50	0.0

Table 2: Methane Monitoring Results for the Croft Waste Disposal Site

Sample Date	Well ID	Screened Interval	Water Level (m)	Groundwater Elevation (masl)	Methane Concentration (%)
	BH1	N/A	1.36	292.46	0.6
	BH8	290.43 – 285.93	3.69	288.78	0.5
	BH9	288.67 – 285.62	1.71	288.73	0.5
November 17, 2022	BH10	289.89 – 286.77	1.12	290.71	0.6
	BH11	289.76 – 286.34	2.31	290.3	0.6
	BH12	287.60 - 282.80	1.52	288.35	0.5
	BH13	287.72 – 284.72	4.23	287.34	0.6



	BH14	286.32 – 283.32	1.51	288.75	0.6
	DP7	288.30 – 287.60	1.52	288.25	0.5
	DP8	290.04 – 289.14	Dry.	N/A	0.6
	DP9	289.57 – 288.67	1.15	289.77	0.6
	BH1	N/A	1.08	292.74	0.2
	BH8	290.43 – 285.93	2.71	289.76	0.1
	BH9	288.67 – 285.62	1.47	288.97	0.1
	BH10	289.89 – 286.77	0.94	290.89	0.1
	BH11	289.76 – 286.34	1.34	291.27	0.2
December 15, 2022	BH12	287.60 - 282.80	1.37	288.5	0.2
	BH13	287.72 – 284.72	2.78	288.79	0.1
	BH14	286.32 – 283.32	1.36	288.90	0.1
	DP7	288.30 – 287.60	Dry.	N/A	0.2
	DP8	290.04 – 289.14	1.46	289.6	0.1
	DP9	289.57 – 288.67	Dry.	N/A	0.1

Notes:

 N/A signifies that no data is available. Borehole logs are not available for Chapman groundwater monitoring wells BH1, BH2, BH4, BH5-II, BH6-II, and BH7-II, and for Croft groundwater monitoring well BH1. Available borehole logs are provided in the attached Appendix I.

2. Shaded data indicates that the well screen is submerged, based on the measured groundwater elevations and screened intervals indicated in the borehole logs. Methane gas measurements in groundwater monitoring wells with submerged screens are not representative of the soil migration methane concentrations.

4.0 FINDINGS

For landfill sites, gas is generated as the waste within the landfill decomposes and varies depending on the stage of decomposition and the characteristics of the waste. Depending on the age and volume of the waste, gas produced at high concentrations may present fire and explosion hazards.



Under Ontario Regulation 232/98, the specified methane concentration limits include:

- Less than 1.0% methane gas in an on-site building, or its foundation;
- Less than 2.5% methane gas in the subsurface at the property boundary; and
- Less than 0.05% methane gas (i.e. not present) in a building, or its foundation, which is located off-site.

Methane concentrations detected at each of the monitoring locations for the Chapman and Croft Waste Disposal Sites during both the fall and winter monitoring events were within the limits specified in O. Reg. 232/98. Methane concentrations measured at the Chapman WDS monitoring wells ranged from 0.0% to 0.6% and at the Croft WDS monitoring wells ranged from 0.1% to 0.6%, which is well below the applicable limit of 2.5% methane gas in the subsurface property boundary. As landfill gas exceedances were not detected at the Sites, there are no explosive concerns related to landfill gas for nearby structures. It is not interpreted that on-going monitoring of methane gas is required for either waste disposal site.

Encl: Appendix I: Borehole Logs

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APPENDIX I

Borehole Logs

Log of Borehole: BH3-II									
Project #: 225335.001 Logged By: KM									
D	Project: Hydrogeology Assessment								
Client: Municipality of Magnetawan									
		Loc	ation: 🤇	hapman Wa	ste Disposal Site, Magn	etawan, Ontario			
	Drill Date: September 28, 2018 Project Manager: TM								
		SUBSURFACE PROFILE			SA	MPLE			
Depth	Symbol	Description	Measured Depth (m)	Monitoring Well Details	Sample #	Recovery (%)			
ft m		Ground Surface	0.00						
0 1 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 4 1 1 1 1 1 1 1 1 1 1 1 1 1		Sand Brown sand, some gravel, dry, no PHC odour or staining. Sand and Silt Grey sand and silt, damp, no PHC odour or staining. Sand and Silt Grey sand and silt, saturated, no PHC odour or staining.	3.05 3.66	Screen Riser	SS1 SS2				
18 18 19				Silica					
20		End of Borebole	0.10						
21									
22									
24									
25-									
Cont	racto	r: CCC	on 11-1-	hto Duin-	Grade Elevatio	on: NA			
Drilli	na Mi	957 Cambrid ethod: Hollow Auger	an Heig	nts Drive	Top of Casing	Elevation: NA			
		Su soo	nte 203		TOP OF Casiliy				
Well	Well Casing Size: 5.08 cmSudbury, ON P3C 5S5Sheet: 1 of 1								

Log of Borehole: BH4-II									
		/	Pro	oject #:	225335.001		Logged By: KM		
				oject: H	ydrogeology A	ssessment			
	Client: Municipality of Magnetawan								
	Location: Chapman Waste Disposal Site, Magnetawan, Ontario								
			Dri	ill Date:	September 2	7, 2018	Project Manager: TM		
	SUBSURFACE PROFILE SAMPLE								
Depth		Symbol	Description	Measured Depth (m)	Monitoring Well Details	Sample #	Recovery (%)		
ft m			Ground Surface	0.00					
1 1 2 3 4 5 6 7 8 9	1		Sand Coarse brown sand, some gravel, dry, no PHC odour or staining.	3.05	Bentonite				
	3		Sand and Gravel	5.05					
11 12 13 14 14 15	4		Coarse brown sand and gravel, trace cobbles, damp, no PHC odour or staining. Bedrock Bedrock.	3.96		551			
	5		Auger refusal on assumed						
18 19 20 21 22 23 24 25	6 7		bedrock. Sandseamat 20'.		Screen Screen				
	8			0 4 4					
28-1 29-1 30	9		End of Borehole	0.44					
Co	ntr	ractor	r: CCC			Grade Elevation	n: NA		
Dri	llir	na Ma	957 Cambi	rıan Hei	ghts Drive	Ton of Cooins 1	Elovation: NA		
		iy ivit		uite 203	3	rop of Casing E			
We	Well Casing Size: 5.08 cmSudbury, ON P3C 5S5Sheet: 1 of 1								

Log of Borehole: BH6-III										
	/	Proj	ect #: <mark>2</mark>	25335.001		Logged By: KM				
		Proj	ect: Hy	drogeology A	ssessment					
Client: Municipality of Magnetawan										
Location: Chapman Waste Disposal Site, Magnetawan, Ontario										
	Drill Date: September 28, 2018 Project Manager: TM									
	SUBSURFACE PROFILE SAMPLE									
Depth	Symbol	Description	Measured Depth (m)	Monitoring Well Details	Sample #	Recovery (%)				
0 ± 0		Ground Surface	0.00	ा मन्त्र						
11111211111111111111111111111111111111		Sand and Gravel Coarse sand and gravel, some cobbles, damp, no PHC odour or staining.	3.05	Riser						
10 11 12		Sand and Gravel Coarse sand and gravel, large cobbles, damp, no PHC odour or			SS1					
13 4 14 1 15 1 16 5 17 1		Bedrock Bedrock.	3.96	Screen						
18 19 20 21 21		Auger refusal on assumed bedrock.	6.30	Silic						
22 - 7 23 - 7 24 25										
Cont	tracto	r: CCC 957 Cambria	an Heig	hts Drive	Grade Elevation	n: NA				
Drilli	ing Me	ethod: Hollow Auger Su	ite 203	-	Top of Casing E	Elevation: NA				
Well	Casin	ng Size: 5.08 cm Sudbury,	ON P3	C 5S5	Sheet: 1 of 1					
	Wen casing size. 5.06 cm									

Log of Borehole: BH8-I									
	Project #: 225335.001 Logged By: KM								
	Project: Hydrogeology Assessment								
	Client: Municipality of Magnetawan								
	Location: Chapman Waste Disposal Site, Magnetawan, Ontario								
	Drill Date: September 27, 2018 Project Manager: TM								
		SUBSURFACE PROFIL	E		SA	MPLE			
Depth	Symbol	Description	Measured Depth (m)	Monitoring Well Details	Sample #	Recovery (%)			
ft m		Ground Surface	0.00						
1 2 1 2 1 2 1 2 1 2 1 2 1 4 1 4 1 4 1 4 1 1 2 8 1 1 4 1 1 1 1 1 1 1 1 1 1 1 1 1	7.87	Sand Coarse, brown sand with some gravel, no PHC odour or staining.	4.27		SS1				
15 16		Coarse, brown sand and gravel, trace cobbles, no PHC odour or		Screet and -	SS2				
		staining.		ica Sa					
18-									
			6.05						
		End of Borehole							
22									
23 7									
24									
25									
Conf	ractor	: CCC	1	1	Grade Elevatio	on: NA			
D-:!!!	na 14-	957 Cam	brian Heig	hts Drive					
	ng we		Suite 203	• • • •	fop of Casing	Elevation: NA			
Well	Well Casing Size: 5.08 cmSudbury, ON P3C 5S5Sheet: 1 of 1								

Log of Borehole: BH9-I										
	Project #: 225335.001 Logged By: KM									
		Pro	ject: Hy	drogeology A	ssessment					
	Client: Municipality of Magnetawan									
Location: Chapman Waste Disposal Site, Magnetawan, Ontario										
	Drill Date: September 28, 2018 Project Manager: TM									
	SUBSURFACE PROFILE SAMPLE									
Depth	Symbol	Description	Measured Depth (m)	Monitoring Well Details	Sample #	Recovery (%)				
$\begin{array}{c c} ft m \\ 0 + 0 \end{array}$		Ground Surface	0.00							
1 2 3 4 4 5 6 7 8 9 10 11 12 13 14 14 14 14 14 14 14 14 14 14		Sand Coarse brown sand, damp, no PHC odour or staining.	4.27	Bentonite	SS1					
17 18 19 20 21 21 22 23 23 24 25		saturated, no PHC odour or staining.		Screen	AS2					
26 - 8			8.23							
28 28 29 30 		End of Borehole								
Cont	racto	r: CCC			Grade Elevatior	n: NA				
יוויים	na M-	957 Cambri	ian Heig	hts Drive	Tan af Oasta					
	ng We	Sulou. Hollow Augel St	uite 203		i op of Casing E	zievation: NA				
Well	Casir	ng Size: 5.08 cm Sudbury	, ON P3	Well Casing Size: 5.08 cmSudbury, ON P3C 5S5Sheet: 1 of 1						

	Log of Borehole: BH10-I									
		/		Project #	: 22	5335.001		Logged By: KM		
	Project: Hydrogeology Assessment									
1	Client: Municipality of Magnetawan									
	Location: Chapman Waste Disposal Site, Magnetawan, Ontario									
				Drill Date	e: Se	eptember 26	, 2018	Project Manager: TM		
	SUBSURFACE PROFILE SAMPLE									
Depth	- - -	Symbol	Description	Measured	Depth (m)	Monitoring Well Details	Sample #	Recovery (%)		
0 	m - 0		Ground Surface	0.0	0	मिन्स				
$ \begin{array}{c} 1 \\ 1 \\ 2 \\ 1 \\ 1 \\ 2 \\ 1 \\ 1 \\ 1 \\ 1 \\$	-1 -2 -3 3 		Sand Coarse, brown sand, some grav trace cobbles, damp, no PHC odour or staining. Bedrock Refusal on assumed bedrock End of Borehole	/el, 1.5 (. 4.8	i 2 8	Screen Riser				
C	ont	ractor	r: CCC				Grade Elevatio	n: NA		
	rilli	na Ma	957 Cal	mbrian He	eigh	ts Drive				
				Suite 20	U3		rop of Casing			
Ν	Well Casing Size: 5.08 cmSudbury, ON P3C 5S5Sheet: 1 of 1									

Log of Borehole: BH11							
	/	P	Project #: 2	25335		Logged By: KM	
			Project: Hydrogeology Assessment				
			<i>lient:</i> Mun	icipality of Ma	agnetawan		
			ocation: C	hapman Was	ste Disposal Site, Magne	etawan, Ontario	
	-	D	orill Date: S	September 26	6, 2018	Project Manager: TM	
		SUBSURFACE PROFIL	_E	I	SAN	IPLE	
Depth	Symbol	Description	Measured Depth (m)	Monitoring Well Details	Sample #	Recovery (%)	
$0 \frac{\text{ft}}{1} 0$::1::	Ground Surface	0.00	ाम्म			
1		Sand and Silt Brown sand with silt, damp, no		199	SS1		
2		PHC odour or staining.		111			
3-1							
4				Ionit Lise			
				Ben			
8							
9-1							
10 3	<u></u>	Cond	3.05				
11		Coarse, brown sand, saturated, n	0	sa Si	SS2		
12		PHC odour or staining.		Sili Sci			
13 4							
14-					4.51		
16	· · · · · · · · · · · · · · · · · · ·		4.88		A51		
17 - 5		End of Borehole					
18							
19							
20 6							
21							
23 + 7							
25							
		r: 000	1		Grada Elavatia	2: NIA	
Cont	Iacio	957 Cam	brian Heig	hts Drive	Graue Elevation	1. NA	
Drilli	ng Me	ethod: Hollow Auger	Suite 203		Top of Casing I	Elevation: NA	
Well	Casir	ng Size: 5.08 cm Sudbu	iry, ON P3	C 5S5	Sheet: 1 of 1		

BORE	HOLE LOG	PROJECT	603	3643	4		E	BOR	EH	OLE	: D	P7		1 of 1
Subsurface Croft Lan Client: T	e Investigation dfill ownship of Magnetawan	Northing: N/A DAT Easting: N/A LOG Methodology: Hand Auger GRO Contractor: N/A GRO					E: GE	Ju D B D E	ne 9, Y LEV	2015 TLC 289.	/SRB 30 m	ASL		
DEPTH (m) (mASL)	STRATIGRAPHIC I	DESCRIPTION	MONITOR DETAILS & NUMBER	NUMBER	TYPE	N VALUE	% WATER	% REC	% RQD	RE	CO\ (%	/ERY	F	RQD (%)
0.3 289.0 0.5 288.8 1 1.7 287.6	TOPSOIL Dark brown to black, silty topsoil, occasional rootlets, moist becomin (0.2 m. SAND Brown to grey fine to medium same silt, saturated. -Changing to a silty fine sand with and cobles below about 0.4 m. SANDY SILT TILL Brown to grey silty sand to sandy sobserved, trace fine gravel, moist 0 -Hand auger refusal in dense till at Borehole teminated at 1.72 m in as point refusal on assumed bedrock.	trace to some sand, g saturated below about d, trace fine gravel, trace occasional fine gravel silt till, brown oxidation to wet, dense. about 0.8 m ssumed till due to drive			GS							5100	25.5	

Printed: Jan 15, 16 File Location:



BOREHO	DLE LOG	PROJECT:	ROJECT:60336434BOREHOLE:DP81orthing:N/ADATE:June 9, 2015						1 of	f1					
Subsurface In Croft Landfi Client: Tow	nvestigation 11 vnship of Magnetawan	Northing: Easting: Methodolog Contractor:	y: H	Iand .	N/A DATE: June 9, 2015 N/A DATE: June 9, 2015 Id Auger N/A GROUND ELEV 290.54 m A							AS	L		
DEPTH (m) (mASL)	STRATIGRAPHIC DE	SCRIPTION	MONITOR DETAILS & NUMBER	IUMBER	TYPE	NALUE WY	NATER 3	REC	RQD	REC	:OV (%)	ERY	I	2QI (%))
1.4 1.4 1.4 1.4 1.4 1.4 1.4 1.4	TOPSOIL Dark brown to black, silty topsoil, trac occasional rootlets, moist. SAND Brown to grey fine to medium sand, tr silt, wet. -Becoming saturated below about 0.4 -Changing to a silty fine sand with trad about 0.5 m. -Hand auger refusal in dense soil at ab Borehole teminated at 1.41 m in assund drive point refusal on assumed bedroct	ee to some sand, ace fine gravel, trace m. ce fine gravel below out 0.9 m ned silty sand due to k.				N	6P.		0/0	25 5		5100	25 5		
Printed: Ja	an 15, 16			-	_	_	_		-			-			

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BOREHO	DLE LOG	PROJECT:	603	36434		1	BOR	EH	OLE:	DP9		1	of 1	
Subsurface In Croft Landfi Client: Tow	nvestigation 11 /nship of Magnetawan	Northing: Easting: Methodolog Contractor:	y: H	I I Iand Au	N/A N/A Iger N/A		DAT LOG GRO	E: GEI UN	Jun D BY D EL	e 9, 20 T EV 2	15 LC/9 89.9	SRB 7 m /	ASL	
DEPTH (m) (mASL)	STRATIGRAPHIC DES	CRIPTION	MONITOR DETAILS & NUMBER	NUMBER	SA BALLE	& WATER	8 REC	& RQD	REC	COVE (%)	RY	R(QD %)	1
0.2 289.8 1 1.3 288.7	TOPSOIL Dark brown to black, silty topsoil, trace occasional rootlets, saturated. SAND Grey fine to medium sand, trace fine gra saturated. -Changing to a medium sand with trace about 0.7 m. -Grey silty sand noted below about 0.9 -Hand auger refusal in dense soil at abo Borehole teminated at 1.27 m in assume	to some sand, avel, trace silt, fine sand below m. ut 1.0 m. ed silty fine sand.						of	25	50 75 14		25 50	7510	



BOREHO	OLE LOG	PROJECT:	603	3643	4		В	OR	EH	OLE:	BH8	1	of 1
Subsurface In Croft Landfi Client: Tow	nvestigation ill vnship of Magnetawan	Northing: Easting: Methodolog Contractor:	y: Au por	ger/C	N/A N/A Coring	A g g	D L G	AT OG RO	E: GEI UNI	June D BY D ELI	22, 2015 SRB EV 291.0	53 m A	SL
DEPTH (m) (mASL)	STRATIGRAPHIC DE	SCRIPTION	MONITOR DETAILS & NUMBER	UMBER	YPE 6	VALUE WA	WATER	REC	RQD	REC	OVERY (%)	R((%	2D %)
0.2 291.5	TOPSOIL Dark brown, silty topsoil, trace to som moist. SAND Brown fine to medium sand, trace coa medium gravel, moist.	ne sand, trace rootlets, f		1	SS	9	019	ale.	8 ¹	25 5	0 75 100	25 50	75100
1.0 1 90.6 1	GNEISSIC BEDROCK Grey to black metamorphic bedrock, s biotite with garnet mineralization, mas	some quartzite and ssive.		3	HQ).23m		100	100				Î
2				4	HQ			100	100		Į		
				- 6	HQ			100	92		-		
				7	HQ			100	92				•
5.7 35.9	Borehole terminated at 5.72 m in Gnie	ssic Bedrock.											

Subsurfac Croft Lan Client: T	e In ndfil	vectoration		. 005.	3643	4		B	OR	EH	OLE:	BH9	1	of 1
		l nship of Magnetawan	Northing: Easting: Methodolog Contractor:	y: Aug pon	ger/C til di	N/A N/A oring	A A g		AT OG RO	E: GEI UN	June D BY D EL	22, 2013 SRB EV 289.	5 3 52 m A	ASL
DEPTH (m) mASL)	STRATIGRAPHY	STRATIGRAPHIC DESC	CRIPTION	MONITOR DETAILS & NUMBER	NUMBER	TYPE	N VALUE WY	% WATER	% REC	% RQD	REC	OVERY (%)	R((9)	2D %) 75 10
1 1 1 1 1		SAND Brown fine to medium sand, some fine g -0.15 m layer of brown to grey silty fine at about 0.2 m. -0.15 m layer of medium to coarse sand, saturated, at bedrock contact.	ravel, wet. sand, trace gravel some gravel,		2	SS	4			-				
1.4 288.2 2	Manage and Charles	GNEISSIC BEDROCK Grey to black metamorphic bedrock, sor biotite with garnet mineralization, massi	ne quartzite and ve,		3	HQ			100	100		8		
3.9 185.6	CULUNICULAN CONTRACT	Borehole terminated at 3.89 m in Gniess	ic Bedrock.		5	HQ			100	100				

BORE	HOLE LOG	PROJECT:	603	3643	4		B	OR	EH	OLE	: BH10		1 of 1
Subsurface Investigation Northing: N/A DATE: Ju Croft Landfill Methodology: Auger/Coring LOGGED B Client: Township of Magnetawan Contractor: pontil drilling GROUND E								Jun D BY D EL	e 23, 20 7 SF LEV 29	15 2B 0.87 m	1 ASL		
DEPTH (m)	AHdrad STRATIGRAPHIC	DESCRIPTION	ONITOR ETAILS NUMBER	BER	E EVAN	ALUE	ATER	EC	QD	REC	COVER	Y I	RQD (%)
mASL)	STRI		20 v	MUN	LΥΡ	N N	% M	% R	% R	25	50 75 100	25	50 75 10
0.2 90.7	TOPSOIL Dark brown, silty topsoil, trace to moist. <u>SAND</u> Brown silty sand, trace fine grave	some sand, trace rootlets, f		1	SS	0							
1 -	-Becoming fine sand and saturate -Changing to a fine to medium sat	l below about 0.76 m Id below about 0.9 m.		2	SS	23							
				3	SS	21							
2.1 18.7	GNEISSIC BEDROCK Grey to black metamorphic bedro biotite with garnet mineralization,	k, some quartzite and massive.		4 5	HQ HQ			100 100			-		
3 -				. 6	HQ			100					
4.1 4 86.8	Borehole terminated at 4.06 m in t	Gniessic Bedrock.		-									
rinted	1:Jan 15, 16									_		Δ=	CO

OREHOLE LOG PROJEC bsurface Investigation Northing: Easting:				3643	4		B	OR	EH	OLE	: BI	411		1 of 1
ace In andfi Tow	nvestigation 11 ⁄nship of Magnetawan	Northing: Easting: Methodolog Contractor:	y: Au po	iger/C	N/A N/A Corin rillin	A A g g	D. L. G.	ATI OG RO	E: GEI UN	Jun D BY D EI	e 24, 7 LEV	, 2015 JNB 290.	74 m	ASL
RATIGRAPHY	STRATIGRAPHIC DI	ESCRIPTION	MONITOR DETAILS & NUMBER	JMBER	TPE TERVER	VALUE	WATER	REC	RQD	REG	COV (%)	ERY	F	tQD (%)
	<u>CNEISSIC BEDROCK</u> Grey to black metamorphic bedrock, biotite with garnet mineralization, matrix with garnet mineralization, matrix with garnet mineralization and the second s	some quartzite and assive.		2	HQ	N	- 0(o	<u>مەم</u> 1000 1000	90	25	50 75		25 5	0 75 10
	E an To AHABULARAN AND AND AND AND AND AND AND AND AND A	Ace Investigation andfill Township of Magnetawan STRATIGRAPHIC DI GNEISSIC BEDROCK Grey to black metamorphic bedrock, biotite with garnet mineralization, magnetic bedrock and a series of the series	Encile LOGS PROJECT: ace Investigation Northing: andfill Methodolog Township of Magnetawan Contractor: Image: Contractor: STRATIGRAPHIC DESCRIPTION Image: Contractor: STRATIGRAPHIC DESCRIPTION Image: Contractor: STRATIGRAPHIC DESCRIPTION Image: Contractor: Contractor: Image: Contractor: Contractor:	Image: Stratigation andfill Township of Magnetawan Northing: Easting: Methodology: Au Contractor: po STRATIGRAPHIC DESCRIPTION Image: Stratigation and the strate	Encle LOG PROJECT: 6033643 ace Investigation andfill Township of Magnetawan Northing: Easting: Methodology: Auger/Contractor: ponil d STRATIGRAPHIC DESCRIPTION If an another and an another and biother with gamet mineralization, massive. GNEISSIC BEDROCK Grey to black metamorphic bedrock, some quartizite and biother with gamet mineralization, massive. If an another another and an another	Encle LCG PROJECT: 00330434 ace Investigation andfill Township of Magnetawan Northing: Lasting: N// Lasting: N// Methodology: Auger/Corin Contractor: STRATIGRAPHIC DESCRIPTION STRATIGRAPHIC DESCRIPTION Image: Contractor: Image: Contractor: GNEISSIC BEDROCK Grey to black metamorphic bedrock, some quartzite and biotite with garnet mineralization, massive. Image: Contractor: Image: Contractor: Image: Contractor: Image: Contractor: Image: Contractor: <	Encle LOG PROJECT: 00330434 ace Investigation andfill Township of Magnetawan Northing: Basting: N/A Methodology: Auger/Coring Contractor: STRATIGRAPHIC DESCRIPTION STRATIGRAPHIC DESCRIPTION Image: Contractor: Grey to black metamorphic bedrock, some quartzite and biotile with garnet mineralization, massive. Image: Contractor: Borehole terminated at 4.39 m in Gniessic Bedrock. Image: Contractor	Encline PROJECT: 00336434 B andfill Northing: N/A D Township of Magnetawan Methodology: Auger/Coring D STRATIGRAPHIC DESCRIPTION SAMPLE SAMPLE GREISSIC BEDROCK Grey to black metamorphic bedrock, some quartzite and biotile with garnet mineralization, massive. I HQ B grey to black metamorphic bedrock, some quartzite and biotile with garnet mineralization, massive. I HQ B grey to black metamorphic bedrock, some quartzite and biotile with garnet mineralization, massive. I HQ	Encle Letter PROFECT: 00350834 BOR andfill Northing: Easting: N/A Methodology: Auger/Coring Auger/Coring DATI Loc GRO Township of Magnetawan STRATIGRAPHIC DESCRIPTION SAMPLE SAMPLE STRATIGRAPHIC DESCRIPTION SAMPLE SAMPLE GE Cheiner Stratic and biotite with gamet mineralization, massive. Image: Sample and simple a	Enclute LOG PROFECT: 00350434 DORENT andfill Northing: N/A Maxing: N/A Township of Magnetawan Methodology: Auger/Comp GROW STRATIGRAPHIC DESCRIPTION SAMPLE In the second se	Encle LUG PROPERTY 00306434 BOREHOLE I. MA andfill Township of Magnetawan Northing: Methodology: Auger/Coring Contractor: pontil drilling DATE: Jun DOGED BS GROUND EI STRATIGRAPHIC DESCRIPTION STRATIGRAPHIC description SAMPLE I and a state of the state of t	Encle LCUS PRODELT: 00336434 BOREHOLE: BOREHO	Encle LUG PROJECT: 0035644 Dotterholz: acc investigation andfill Township of Magnetawan Nather Methodology: Auger/Coring Contractor: DATE: June 24, 2015 LOGGED BY STRATIGRAPHIC DESCRIPTION STRATIGRAPHIC DESCRIPTION SAMPLE STRATIGRAPHIC DESCRIPTION RECOVERY (%) GRESSIC BEDROCK Grey to black metamorphic bedrock, some quartizite and biolite with gamet mineralization, massive. Image: Recovery (%) Recovery (%) Borehole terminated at 4.39 m in Gniessic Bedrock. Image: Recovery (%) Image: Recovery (%)	Encle LUG PROJECT: 6033634 BOREHOLE: BH1 ace investigation andfill Township of Magnetawan N/A Methodology: Auger/Coring Contractor: DATE: June 24, 2015 LOGGED BY JNB GROUND ELEV 290.74 m stractic restriction STRATIGRAPHIC DESCRIPTION SAMPLE Township of Magnetawan RECOVERY R (%) RECOVERY R (%) RECOVERY R (%) RECOVERY R (%) RECOVERY R (%) GENERSIC BEDROCK Grey to black metanorphic bedrock, some quartaie and biotite with gamet mineralization, nassive. I I/Q 100 I Borehole terminated at 4.39 m in Gniessic Bedrock. I I/Q 100 I I

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			Log of E	30	rehole:	BH	12		
	/		Project #: 22	533	35.005		Log	gged By: TG	
	DI	NCHIN	Project: Grou	und	water Monito	oring W	/ell Installat	ion	
1	FI	испін	Client: The C	orp	poration of th	e Muni	cipality of N	lagnetawan	
			Location: Cro	oft \	Waste Dispo	sal Site	e, Magnetav	wan, Ontario	
			Drill Date: Ap	oril :	21, 2020		Sh	eet: 1 of 1	
		SUBSURFACE PRO	FILE				S	AMPLE	
Depth	Symbol	Description	Elevation (m)		Monitoring Well Details	Recovery (%)	Sample ID	Soil Vapour Concentration (ppm) CGI/PID	Laboratory Analysis
		Ground Surface	0.00						
0+0 1+1 2+1 3+1 4+1 5+1		Gneissic Bedrock Grey to black metamorphic bedrock, si quartzite and biotite with garnet minera ization, massive	ome al,		Bentonite	100	RC1	-	
6 7 7 8 9 10 10 11 3					lica Sand [_]	100	RC2	_	
11 12 13 14 14 15					S	100	RC3		
16 17 17 18 19 19 			-6.10	0		100	RC4		
20		End of Borehole			_				
22 23 24 24 25									
Con	tractor	Marathon Underground Constru	uctors Corpora	atio	n <i>Grad</i> e	e Eleva	tion: 288.8	96 mREL	
Drilli	ina Mei	t hod: HQ Diamond Core Bit			Τορο	f Casir	na Elevatio	n: 289 866 mF	REL
Well	Casin	g Size: 5.08 cm			UTM C	Coordi	nates: 17T	593608mE 50	58582 mN

	Log of Borehole: BH13 Project #: 225335.005 Logged By: TG												
	/	Pro	ject #: 225	335.005		Lo	gged By: TG						
	DI	NCHIN Pro	ject: Groun	idwater Monif	toring W	/ell Installat	ion						
	FI	Clie	ent: The Co	rporation of t	he Mun	icipality of N	lagnetawan						
		Loc	ation: Crof	t Waste Disp	osal Sit	e, Magneta	wan, Ontario						
		Dril	<i>I Date:</i> Apri	il 22, 2020		Sh	eet: 1 of 1						
		SUBSURFACE PROFIL	E			S	AMPLE						
Depth	Symbol	Description	Elevation (m)	Monitoring Well Details	Recovery (%)	Sample ID	Soil Vapour Concentration (ppm) CGI/PID	Laboratory Analysis					
ft m			0.00	T									
0 + 0 1 + 1 2 + + 3 + + 4 + + 5 + +		Ground Surface Gneissic Bedrock Grey to black metamorphic bedrock, some quartzite and biotite with garnet mineral, ization, massive	0.00	Riser	100	RC1							
6 7 8 9 10 10 10				∭ lica Sand [≜]	100	RC2	_						
11 12 13 14 14 15				Screen	100	RC3							
16 17 17 18 19 19 			-6.10		100	RC4							
20 21		End of Borehole											
22 23 24 25													
Con	tractor:	Marathon Underground Constructor	s Corporati	on Grad	le Eleva	ation: 290.8	21 mREL						
Drilli	ina Mei	thod: HQ Diamond Core Bit	-	Top	of Casi	na Elevatio	n: 291 566 m	REI					
Well	Casing	g Size: 5.08 cm		υтм	Coordi	nates: 17T	593714 mE 50	058508 mN					

	107		.og of B	orel	hole	: BH	14		
	/	PI	roject #: 225	335.00)5		Lo	gged By: TG	
	DI	NCHIN P	roject: Grour	ndwate	r Monit	oring W	/ell Installat	ion	
	FI	C.	<i>lient:</i> The Co	orporat	ion of tl	ne Mun	icipality of N	lagnetawan	
		Lo	ocation: Cro	ft Wast	e Disp	osal Sit	e, Magneta	wan, Ontario	
		D	rill Date: Apr	il 22, 2	020	1	Sh	eet: 1 of 1	
		SUBSURFACE PROF	ILE				S	AMPLE	
Depth	Symbol	Description	Elevation (m)	Monitorina	Well Details	Recovery (%)	Sample ID	Soil Vapour Concentration (ppm) CGI/PID	Laboratory Analysis
ft m			0.00	т					
0 + 0 1 + 1 2 + 1 3 + 1 4 + 1 5 + 1		Ground Surface Gneissic Bedrock Grey to black metamorphic bedrock, som quartzite and biotite with garnet mineral, ization, massive	0.00	Riser	Bentonite	100	RC1	-	
6 7 8 9 10 10 10					llica Sand [_] ੈ	100	RC2	_	
11 12 13 14 14 15				Screen	S	100	RC3		
16 17 17 18 19 19 			-6.10			100	RC4		
20		End of Borehole							
22-1- 23-1-7 24-1- 25-1-									
Con	tractor	Marathon Underground Construct	tors Corporat	ion	Grad	e Eleva	ation: 289.4	16 mREL	
Drilli	ina Mei	thod: HQ Diamond Core Bit	-		Top	of Casi	na Elevatio	n: 290 259 m	REI
Well	Casin	<i>g Size:</i> 5.08 cm			UTM	Coordi	nates: 17T	593733 mE 50	 058558 mN